

## REMARKS

Applicants appreciate the detailed examination evidenced by the Official Action mailed September 8, 2005 (hereinafter "the Official Action"). In response, Applicants have amended independent Claims 1, 19, and 20 to further clarify the patentable subject matter recited therein in view of the cited references. As described hereinbelow in greater detail, Applicants respectfully submit that none of the cited references discloses or suggests, either singularly, or in combination, for example, "removing a portion of the flowable material and a portion of the barrier layer outside the intaglio pattern to expose an upper surface of an outside layer" and "forming a conductive layer on . . . the barrier layer inside the intaglio pattern . . . wherein the conductive layer comes in contact with the barrier layer and the upper surface." Accordingly, Applicants respectfully request the withdrawal of all rejections and the allowance of all claims for at least the reasons described herein.

### **Amended Independent Claim 1 is Patentable over the Cited References.**

Independent Claim 1 stands rejected over U.S. Patent No. 5,354,712 to Ho et al. ("Ho '712"). *Official Action*, page 2. Applicants have amended independent Claim 1 to recite in part:

- forming an intaglio pattern in a mold layer;
- forming a barrier layer on an upper surface of the mold layer and in the intaglio pattern;
- forming a flowable material on the barrier layer;
- removing a portion of the flowable material and a portion of the barrier layer outside the intaglio pattern** to expose an upper surface of an oxide layer included in the mold layer and avoiding removing a portion of the flowable material and a portion of the barrier layer inside the intaglio pattern;
- removing the portion of the flowable material from inside the intaglio pattern;
- forming a conductive layer** on the portion of the barrier layer inside the intaglio pattern and on the upper surface wherein the conductive layer comes in contact with the barrier layer and the upper surface; and
- removing the conductive layer from the upper surface

As demonstrated by the above-highlighted recitations of amended independent Claim 1, Ho '712 does not disclose, at least, removing a portion of the

flowable material and a portion of the barrier layer outside the intaglio pattern. In fact, Ho '712 does not appear to even disclose a flowable material as claimed. In particular, as shown in Figure 2C of Ho '712, a copper layer 68 is formed in a via hole on a TiN layer 66. Therefore, as understood by Applicants, Ho '712 does not disclose, for example, removing a portion of the flowable material and a portion of the barrier layer outside the intaglio pattern as **Ho '712 does not disclose the formation of any flowable material**, but rather discusses the formation of a copper layer.

Furthermore, Ho '712 also does not disclose that the copper layer 68 comes in contact with a mold layer. In contrast to Ho '712, as recited in amended independent Claim 1, a conductive layer is formed "on the portion of the barrier layer inside the intaglio pattern and on the upper surface, wherein the conductive layer comes in contact with the barrier layer and the upper surface" [of the mold layer]. Accordingly, Ho '712 also does not disclose these additional recitations of amended independent Claim 1. The other cited references also do not disclose all of the recitations of amended independent Claim 1.

Applicants respectfully point out that a proper rejection under Section 102 requires an identity between the claimed subject matter and the disclosure of the reference. In particular, anticipation under Section 102 requires that each and every element of the claim is found in a single prior art reference. *W. L. Gore & Associates Inc. v. Garlock, Inc.*, 721 F.2d 1540, 1554, 220 U.S.P.Q. 303, 313 (Fed. Cir. 1983). Stated another way, all material elements of a claim must be found in one prior art source. *In re Marshall*, 198 U.S.P.Q. 344 (C.C.P.A. 1978). "Anticipation under 35 U.S.C. § 102 requires the disclosure in a single piece of prior art of each and every limitation of a claimed invention." *Apple Computer Inc. v. Articulate Systems Inc.* 57 USPQ2d 1057, 1061 (Fed. Cir. 2000). **A finding of anticipation further requires that there must be no difference between the claimed invention and the disclosure of the cited reference as viewed by one of ordinary skill in the art.** See *Scripps Clinic & Research Foundation v. Genentech Inc.*, 927 F.2d 1565, 1576, 18 U.S.P.Q.2d 1001, 1010 (Fed. Cir. 1991). Additionally, the cited prior art reference must be enabling, thereby placing the allegedly disclosed matter in the possession of the public. *In*

*re Brown*, 329 F.2d 1006, 1011, 141 U.S.P.Q. 245, 249 (C.C.P.A. 1964). Thus, the prior art reference must adequately describe the claimed invention so that a person of ordinary skill in the art could make and use the invention.

In view of the above, Applicants respectfully submit that amended independent Claim 1 is patentable over Ho '712 for at least the reasons described herein. Furthermore, dependent Claims 2-18 are also patentable over Ho '712 for at least the reasons described above in reference to amended independent Claim 1.

**Amended Independent Claims 19 and 20 are Patentable Over the Cited Art.**

Claims 2-5, 7-12, 19, and 20 stand rejected under 35 U.S.C. § 103 over Ho '712 in view of U.S. Patent No. 5,970,374 to Teo ("Teo") and further in view of U.S. Patent No. 6,645,851 to Ho et al. ("Ho '851"). *Official Action, page 3*. Applicants have amended dependent Claim 20 to recite in part:

- forming a contact hole in a mold layer on a lower conductive pattern;
- forming a groove on the contact hole in the mold layer, the groove being wider than the contact hole;
- forming a barrier layer in the groove and outside the groove on an upper surface of an oxide layer included in the mold layer;
- forming a flowable material on the barrier layer;
- removing the flowable material to expose the upper surface and to avoid removing the flowable material from inside the groove;
- removing the flowable material from inside the groove;
- forming a conductive layer in the groove and on the exposed upper surface of the second mold layer, **wherein the conductive layer comes in contact with the barrier layer and the exposed upper surface of the mold layer**; and
- removing the conductive layer to expose the upper surface and to avoid removing the conductive layer from inside the groove.

Claim 19 has been similarly amended.

In establishing a *prima facie* case of obviousness, one of the basic criteria that must be met is that the prior art reference (or references when combined) must teach or suggest all the claim limitations. However, as shown below, even if Ho '712, Teo and Ho '851 were to be combined, the combination would not disclose or suggest all of the recitations of amended independent Claims 19 and 20. In particular, as demonstrated by the above-highlighted recitations of amended independent Claim 20,

the cited references do not disclose or suggest, either singularly or in combination, that the "conductive layer comes in contact with the barrier layer and the exposed upper surface of the mold layer" as claimed. For example, as discussed above in reference to amended independent Claim 1, Ho '712 does not show that the copper layer 68 comes in contact with the upper surface outside the via. In reference to Teo, as shown in Figures 3B-3E therein, the Tungsten layer 40 comes into contact with the Ti/TiN layer 30, which as understood by Applicants is not a mold layer as claimed. Furthermore, in reference to Ho '851, as shown in Figure 14 therein, the upper electrode 27 is in contact with the insulator layer 26, which is not a mold layer as claimed. Accordingly, even if Ho '712, Teo and Ho '851 were to be combined, the combination would not disclose or suggest all of the recitations of amended independent Claims 19 and 20.

Furthermore, Applicants maintain that the Official Action has not provided any clear and particular evidence of a motivation or suggestion to combine the above-cited references in accordance with Section 103. In addition to the criteria setout above, to establish a *prima facie* case of obviousness, two other basic criteria must be met: there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings, and there must be a reasonable expectation of success of the combination. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, not in applicant's disclosure. See MPEP § 2143. As stated by the Court of Appeals for the Federal Circuit, to support combining references in a § 103 rejection, evidence of a suggestion, teaching, or motivation to combine must be clear and particular, and this requirement is not met by merely offering broad, conclusory statements about teachings of references. *In re Dembiczak*, 50 USPQ2.d 1614, 1617 (Fed. Cir. 1999).

According to the Official Action, the clear and particular evidence offered for the combination is as follows:

It would have been obvious to one of ordinary skill in the art at the time of the invention to have combined the steps taught by Teo and by Ho et al. B with the process taught by Ho et al. A because Ho et al. A teaches that the method of forming dual

damascene structures is well known in the art (col. 1, lines 49-51 and Fig. 1f), and the method taught by Teo and by Ho et al. B protect the barrier as the barrier on the surface of the insulation is removed which would be beneficial to the barrier in the openings. *Official Action*, page 5.

Applicants respectfully submit that the above-cited motivation offered by the Official Action does not meet the standard for **clear and particular evidence** of a motivation or suggestion to combine these references. Accordingly, a *prima facie* case of obviousness has not been established in the Official Action.

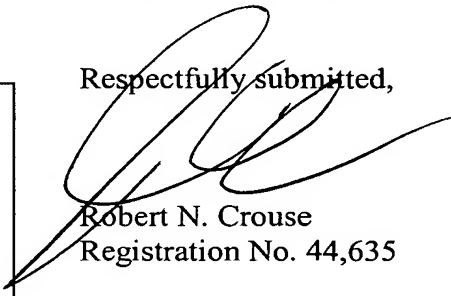
In view of the above, Applicants maintain that amended independent Claims 19 and 20 are patentable over the cited art for at least the reasons described herein.

### **CONCLUSION**

Applicants have amended independent Claims 1, 19, and 20 to further clarify the patentable subject matter therein. Applicants also have shown how the amended claims are not disclosed or suggested by the cited references and, further, that the Official Action has not established a *prima facie* case of obviousness as required under Section 103. Accordingly, Applicants respectfully request the withdrawal of all rejections and the allowance of all claims in due course. If any informal matters arise, the Examiner is encouraged to contact the undersigned by telephone at (919) 854-1400.

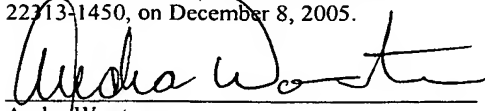
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### **CERTIFICATE OF MAILING UNDER 37 C.F.R. § 1.8**

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